

AMENDMENTS TO CLAIMS

1. (Currently amended) An active pixel sensor disposed on a semiconductor substrate, comprising:

a photosensor having a first terminal and a second terminal, said first terminal coupled to a first reference potential;

a reset transistor having a first terminal coupled to said second terminal of said photosensor, a second terminal coupled to a reset potential, and a third terminal coupled to a reset line;

a plurality of transfer transistors, each transfer transistor having a first terminal directly connected to said second terminal of said photosensor, a second terminal, and a third terminal connected to a transfer line; and

a plurality of storage nodes, each storage node coupled to a separate one of said second terminals of said plurality of transfer transistors.

2. (Original) An active pixel sensor as in claim 1, further including means coupled to said plurality of storage nodes for outputting a value from any of said plurality of storage nodes.

3. (Currently amended) An active pixel sensor as in claim 1, wherein said transfer line comprises a plurality of transfer lines, and ~~further including a plurality of transfer lines, wherein~~ each of said plurality of transfer lines is connected to a separate one of said third terminal of said plurality of transfer transistors.

4. (Original) An active pixel sensor as in claim 2, wherein each separate one of said plurality of storage nodes is coupled to said means for outputting a value from any of said plurality of storage nodes by a separate one of a plurality of readout transistors having a first terminal connected to said separate one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal connected to said means for outputting a value from any of said plurality of storage nodes.

5. (Original) An active pixel sensor as in claim 1, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

6. (Original) An active pixel sensor as in claim 2, wherein said means for outputting a value includes:

a plurality of column output lines;

a row select line; and

a plurality of row select transistors, each of said row select transistors having a first terminal coupled to one of said plurality of storage nodes, a second terminal coupled to one of said plurality of column output lines, and a third terminal coupled to said row select line.

7. (Original) An active pixel sensor as in claim 6, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to said second terminal of said photosensor by a separate one of a plurality of transfer transistors having a first terminal connected to said second terminal of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

8. (Original) An active pixel sensor as in claim 6, wherein each separate one of said plurality of storage nodes is coupled to said first terminal of a separate one of said plurality of row select transistors by a separate one of a plurality of readout transistors having a first terminal connected to said separate one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal coupled to said first terminal of said separate one of said plurality of row select transistors.

9. (Original) An active pixel sensor as in claim 6, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

Claims 10-20 (Withdrawn).

21. (Original) An active pixel sensor as in claim 2, wherein said means for outputting a value includes:

a plurality of column output lines;

a plurality of row select lines; and

a plurality of row select transistors, each of said row select transistors having a first terminal coupled to one of said plurality of storage nodes, a second terminal coupled to one of said plurality of column output lines, and a third terminal coupled to one of said plurality of row select lines.

22. (Original) An active pixel sensor as in claim 21, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to said second terminal of said photosensor by a separate one of a plurality of transfer transistors having a first terminal connected to said second terminal of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

23. (Original) An active pixel sensor as in claim 21, wherein each separate one of said plurality of storage nodes is coupled to said first terminal of one of said plurality of row select transistors by a separate one of a plurality of readout transistors having a first terminal connected to said one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal coupled to said first terminal of said one of said plurality of row select transistors.

24. (Original) An active pixel sensor as in claim 21, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

25. (Original) An active pixel sensor as in claim 4, wherein said means for outputting a value includes:

a row select line;

a column bias line;

first and second column output lines;

a row select transistor having a first terminal coupled to said row select line, a second terminal coupled to said column bias line, and a third terminal; and

wherein said plurality of storage nodes includes a first node and second storage node, said first storage node is coupled to said means for outputting a value by a first readout transistors having a first terminal coupled to said first storage node, a second terminal coupled to said first column output line, and a third terminal connected to said third terminal of said row select transistor, and said second storage node is coupled to said means for outputting a value by a second readout transistor having a first terminal coupled to said second storage node, a second terminal coupled to said second column output line, and a third terminal connected to said third terminal of said row select transistor

26. (Original) An active pixel sensor as in claim 25, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to said second terminal of said photosensor by a separate one of a plurality of transfer transistors having a first terminal connected to said second terminal of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

27. (Original) An active pixel sensor as in claim 25, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

28. (Currently amended) An active pixel sensor disposed on a semiconductor substrate, comprising:

a photosensor having a first terminal and a plurality of second terminals, said first terminal coupled to a first reference potential;

a reset transistor having a first terminal coupled to said at least one of said plurality of second terminals of said photosensor, a second terminal coupled to a reset potential, and a third terminal coupled to a reset line;

a plurality of transfer transistors, each transfer transistor having a first terminal directly connected to a separate one of said plurality of second terminals of said photosensor, a second terminal, and a third terminal connected to a transfer line; and

a plurality of storage nodes, each of said plurality of storage nodes coupled to a separate one of said second terminals of said plurality of transfer transistors.

29. (Original) An active pixel sensor as in claim 28, further including means coupled to said plurality of storage nodes for outputting a value from any of said plurality of storage nodes.

30. (Cancelled).

31. (Original) An active pixel sensor as in claim 29, wherein each separate one of said plurality of storage nodes is coupled to said means for outputting a value from any of said plurality of storage nodes by a separate one of a plurality of readout transistors having a first terminal connected to said separate one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal connected to said means for outputting a value from any of said plurality of storage nodes.

32. (Original) An active pixel sensor as in claim 28, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

33. (Original) An active pixel sensor as in claim 29, wherein said means for outputting a value includes:

a plurality of column output lines;

a row select line; and

a plurality of row select transistors, each of said row select transistors having a first terminal coupled to one of said plurality of storage nodes, a second terminal coupled to one of said plurality of column output lines, and a third terminal coupled to said row select line.

34. (Original) An active pixel sensor as in claim 33, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to one of said plurality of second terminals of said photosensor by a separate one of a plurality of transfer transistors having a first terminal connected to said one of said plurality of second terminals of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

35. (Original) An active pixel sensor as in claim 33, wherein each separate one of said plurality of storage nodes is coupled to said first terminal of a separate one of said plurality of row select transistors by a separate one of a plurality of readout transistors having a first terminal connected to said separate one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal

coupled to said first terminal of said separate one of said plurality of row select transistors.

36. (Original) An active pixel sensor as in claim 33, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

Claims 37-47 (Withdrawn).

48. (Original) An active pixel sensor as in claim 29, wherein said means for outputting a value includes:

a plurality of column output lines;

a plurality of row select lines; and

a plurality of row select transistors, each of said row select transistors having a first terminal coupled to one of said plurality of storage nodes, a second terminal coupled to one of said plurality of column output lines, and a third terminal coupled to one of said plurality of row select lines.

49. (Original) An active pixel sensor as in claim 48, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to one of said plurality of second terminals of said photosensor by a separate one

of a plurality of transfer transistors having a first terminal connected to said one of said plurality of second terminals of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

50. (Original) An active pixel sensor as in claim 48, wherein each separate one of said plurality of storage nodes is coupled to said first terminal of one of said plurality of row select transistors by a separate one of a plurality of readout transistors having a first terminal connected to said one of said plurality of storage nodes, a second terminal coupled to a second potential, and a third terminal coupled to said first terminal of said one of said plurality of row select transistors.

51. (Original) An active pixel sensor as in claim 48, further including a plurality of storage elements, each separate one of said storage elements having a first terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

52. (Original) An active pixel sensor as in claim 31, wherein said means for outputting a value includes:

a row select line;

a column bias line;

first and second column output lines;

a row select transistor having a first terminal coupled to said row select line, a second terminal coupled to said column bias line, and a third terminal; and

wherein said plurality of storage nodes includes a first node and second storage node, said first storage node is coupled to said means for outputting a value by a first readout transistors having a first terminal coupled to said first storage node, a second terminal coupled to said first column output line, and a third terminal connected to said third terminal of said row select transistor, and said second storage node is coupled to said means for outputting a value by a second readout transistor having a first terminal coupled to said second storage node, a second terminal coupled to said second column output line, and a third terminal connected to said third terminal of said row select transistor.

53. (Original) An active pixel sensor as in claim 52, further including a plurality of transfer lines, wherein each separate one of said plurality of storage nodes is coupled to one of said plurality of second terminals of said photosensor by a separate one of a plurality of transfer transistors having a first terminal connected to said one of said plurality of second terminals of said photosensor, a second terminal connected to said separate one of said plurality of storage nodes, and a third terminal connected to a separate one of said plurality of transfer lines.

54. (Original) An active pixel sensor as in claim 52, further including a plurality of storage elements, each separate one of said storage elements having a first

terminal coupled to a separate one of said storage nodes, and a second terminal coupled to a second reference potential.

55. (Currently amended) A method of operating an active pixel sensor having a photosensor, a reset transistor, a plurality of storage nodes coupled to said photosensor and means coupled to said plurality of storage nodes for outputting a value from any of said plurality of storage nodes comprising:

turning on the reset transistor to place a reset potential on said photosensor;

transferring charge from said photosensor to a first of the plurality of storage nodes for a first duration; ~~and~~

transferring charge from said photosensor to a second of the plurality of storage nodes for a second duration; and

outputting charge from any of the plurality of storage nodes which is not having charge transferred from said photosensor, wherein said outputting of charge occurs during the transferring of charge.

56. (Original) A method of operating an active pixel sensor as in claim 55 wherein said first duration commences coincident with said second duration.

57. (Original) A method of operating an active pixel sensor as in claim 55 wherein said second duration commences after said first duration has ended.

Claims 58-59 (Withdrawn).